The summer was relatively wet to eastward of the Great Plains, except in the Northeast, but rainfall was deficient in nearly all sections from the Great Plains westward. The fall season was extremely dry over large areas, although amounts of precipitation were decidedly above normal in Utah, Colorado, and Arizona. From the Rocky Mountains eastward it was the driest fall of record, considering the area as a whole.

Alabama, with 59.33 inches, had the largest average total for the year, and Nevada, with 8.45 inches, the least, although this amount was only slightly below the normal. The total yearly falls in the Great Plains and Central Rocky Mountain States were as follows: North Dakota 14.15 inches, the least since 1936; South Dakota 15.71 inches, also the smallest since 1936; Nebraska 16.28 and Oklahoma 20.08 inches. Colorado had only 10.68 inches, somewhat less than the previous driest year of record, 1934, in which only 10.89 inches fell. The average for Wyoming was 9.48 inches, also somewhat lower than the previous driest year, 9.81 inches in 1902. The California average of 15.85 inches was the least since 1932.

Tornadoes, duststorms, and other outstanding features of the weather of 1939 are discussed elsewhere in this issue of the REVIEW.

TABLE 1.—*Monthly and Annual Temperature Departures from Normal for the Year 1939*

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Ala.	+4.6	+4.7	+3.6	−0.9	−0.3	+0.8	+0.6	−1.1	+1.6	+2.2	−2.0	+2.2	+1.3
Ariz.	+.2	−8.9	−.3	+2.3	+1.6	−.2	+1.1	+.7	−.7	−1.4	+2.5	+4.8	+.1
Ark.	+4.1	.0	+2.7	−2.1	+.2	+.7	+1.5	+.1	+5.4	+2.7	−2.5	+2.7	+1.3
Calif.	−.1	−5.5	−1.1	+2.7	+.3	−1.1	−.7	+.8	+1.4	−.3	+1.2	+3.5	+.1
Colo.	+1.9	−7.9	+1.0	+2.3	+3.6	+.8	+2.5	+.9	+3.6	+1.1	+2.5	+6.6	+1.6
Fla.	+1.6	+5.6	+2.8	+.8	−.7	+.5	.0	−1.3	+.9	+1.6	−2.1	−.5	+.8
Ga.	+2.4	+5.5	+2.4	−.6	−1.1	+1.4	+.4	−1.2	+1.4	+2.0	−1.9	+.9	+1.0
Idaho	+3.7	−5.3	+1.1	+2.7	+3.1	−2.6	+.7	+1.3	+1.4	+.3	+2.8	+7.8	+1.4
Ill.	+6.6	+.7	+2.6	−2.7	+3.4	+1.5	+.2	−1.0	+4.5	+2.4	−.2	+4.7	+1.9
Ind.	+5.4	+1.7	+2.2	−3.0	+2.9	+2.1	−.5	+.3	+4.7	+2.8	−1.3	+3.2	+1.7
Iowa	+10.1	−2.0	+1.8	−.9	+6.3	+1.8	+1.6	−1.5	+5.4	+1.8	+3.6	+8.3	+3.0
Kans.	+8.4	−2.6	+2.1	−.2	+4.6	+1.5	+4.3	+.2	+5.7	+3.9	+1.1	+5.9	+2.9
Ky.	+4.4	+3.2	+3.0	−2.5	+.9	+1.2	−.6	−.5	+3.9	+2.7	−2.8	+1.1	+1.2
La.	+3.5	+2.5	+2.0	−1.0	−.4	+.6	+.9	+.1	+1.9	+1.3	−2.2	+3.0	+1.0
Md.-Del.	+1.4	+6.0	+1.8	−.5	+2.6	+2.7	−1.4	+3.0	+1.5	+1.1	−1.6	+2.4	+1.6
Mich.	+3.0	+.4	−.9	−2.2	+3.5	+2.3	+1.5	+2.4	+1.9	+.1	+.1	+5.8	+1.5
Minn.	+5.9	−7.1	−1.4	−2.6	+5.5	+.7	+1.6	+1.2	+4.2	−1.5	+5.8	+10.7	+1.9
Miss.	+3.0	+2.7	+2.8	−1.9	−.3	+.7	+.9	−.2	+2.9	+1.7	−2.9	+1.8	+.9
Mo.	+8.0	−.1	+3.1	−1.8	+2.9	+1.0	+2.0	−1.1	+6.1	+3.6	−.9	+4.6	+2.3
Mont.	+8.9	−6.2	+2.1	+2.7	+3.8	−4.0	+2.1	+1.2	+2.4	+.3	+5.7	+8.7	+2.3
Nebr.	+8.9	−4.6	+3.2	+.3	+6.6	+.9	+4.7	+.3	+5.2	+2.0	+3.4	+7.7	+3.2
Nev.	+3.0	−5.8	+2.2	+4.0	+3.5	+.4	+1.5	+2.7	+1.7	+.6	+3.1	+7.9	+2.1
N. England	−.8	+2.7	−4.5	−3.4	+.1	−.1	+.2	+3.8	−.5	.0	−3.1	+.5	−.4
N. J.	.0	+5.8	+1.0	−1.4	+2.9	+2.0	−.3	+3.5	+.6	+.2	−2.1	+1.5	+1.1
N. Mex.	−.3	−8.2	+.6	+1.3	+1.2	+.9	+.2	−.2	+1.8	−.8	−.5	+3.9	.0
N. Y.	+.2	+4.1	−2.2	−2.5	+2.5	+1.0	+.4	+4.0	−.9	.0	−3.0	+1.4	+.4
N. C.	+1.9	+5.7	+3.1	+.1	−.4	+3.2	−.6	.0	+1.8	+2.7	−3.0	−.3	+1.2
N. Dak.	+8.7	−10.2	−.5	+.2	+6.5	−2.4	+3.7	+2.1	+2.1	−2.5	+8.2	+13.7	+2.5
Ohio	+4.8	+3.4	+1.9	−2.6	+3.2	+3.0	−.8	+1.0	+4.4	+2.6	−1.1	+3.3	+1.9
Okla.	+5.9	−2.1	+3.4	−.5	+3.1	+1.4	+2.5	+.7	+5.7	+4.1	−1.3	+5.3	+2.4
Oreg.	+3.0	−2.9	+1.4	+3.0	+2.3	−2.2	+1.1	+1.5	+2.1	+.1	+.8	+5.8	+1.3
Pa.	+1.8	+5.3	+.9	−1.9	+3.2	+1.8	−.5	+3.0	+1.7	+1.0	−1.6	+2.6	+1.4
S. C.	+2.3	+5.8	+3.1	+.1	−1.1	+3.1	+.2	−.4	+1.8	+2.8	−3.4	+.2	+1.2
S. Dak.	+8.9	−7.9	+2.6	+.3	+7.8	−.1	+4.4	+1.0	+3.9	+.1	+5.8	+10.0	+3.1
Tenn.	+3.5	+3.4	+2.7	−2.0	+.1	+1.6	+.7	−.2	+3.7	+3.2	−2.7	+1.5	+1.3
Tex.	+2.7	−2.8	+2.2	+.5	+2.2	+1.2	+1.4	−.5	+2.3	+1.8	−3.0	+3.5	+1.0
Utah	+1.4	−9.6	+.8	+3.6	+2.7	−.5	+.7	+1.2	+1.1	+.5	+3.2	+7.3	+1.0
Va.	+2.6	+5.9	+2.0	−.6	+1.3	+3.1	−1.3	−.9	+1.7	+1.5	−2.4	+1.5	+1.2
Wash.	+5.8	−2.2	+.5	+2.4	+1.9	−2.0	+.9	+2.0	+2.1	+.6	+2.9	+6.5	+1.8
W. Va.	+3.6	+5.6	+2.4	−1.8	+1.8	+3.0	−1.1	+.9	+2.3	+1.3	−2.4	+2.0	+1.5
Wis.	+6.8	−2.6	−.7	−2.8	+4.3	+1.2	+1.4	+1.0	+2.1	.0	+2.3	+8.3	+1.8
Wyo.	+4.0	−8.0	+2.4	+3.5	+4.3	−2.2	+2.0	−.5	+2.1	+1.2	+3.4	+8.0	+1.7

TABLE 2.—*Percentage of Normal Precipitation, 1939*

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Ala.	99	194	87	82	139	146	89	233	119	14	26	67	108
Ariz.	84	94	65	88	12	11	51	103	335	55	136	29	89
Ark.	145	258	78	146	96	110	88	68	53	55	91	58	104
Calif.	67	54	81	32	99	38	114	70	370	87	17	66	91
Colo.	171	112	88	51	54	59	41	55	83	50	32	51	71
Fla.	59	73	50	151	124	138	105	153	85	71	62	78	96
Ga.	92	187	91	101	119	106	84	137	78	12	30	78	93
Idaho	81	121	74	50	49	107	113	27	98	101	16	122	80
Ill.	137	156	109	148	58	126	103	141	20	79	48	50	98
Ind.	133	172	106	166	38	160	125	78	25	100	47	45	100
Iowa	80	162	103	76	51	114	84	133	22	62	31	52	81
Kans.	118	121	119	76	62	115	43	111	11	30	63	95	80
Ky.	127	232	123	153	34	143	117	77	43	78	33	59	102
La.	116	124	60	52	146	95	97	96	83	66	88	77	92
Md.-Del.	111	169	114	144	32	167	93	116	78	125	51	58	105
Mich.	119	160	81	107	74	158	58	169	81	94	33	70	100
Minn.	163	193	51	70	73	127	71	122	49	83	5	52	88
Miss.	136	166	95	80	125	163	92	66	100	44	41	77	99
Mo.	123	158	97	129	87	117	77	123	20	66	99	71	97
Mont.	74	107	73	70	90	143	49	57	71	81	23	110	79
Nebr.	127	121	110	57	72	102	55	72	21	42	5	100	74
Nev.	81	77	97	101	83	39	167	67	327	193	46	43	110
N. England	78	107	122	137	53	98	61	103	76	134	31	94	91
N. J.	111	154	128	142	38	96	49	148	42	124	58	42	94
N. Mex.	248	86	101	99	63	52	96	71	114	79	94	94	100
N. Y.	98	140	105	113	48	85	60	76	93	107	53	99	90
N. C.	109	191	90	99	69	93	132	126	36	66	72	66	96
N. Dak.	100	137	51	60	66	134	72	101	43	71	5	54	74
Ohio	92	166	121	160	34	173	109	60	70	118	35	53	99
Okla.	191	124	86	72	79	139	55	89	11	57	71	64	86
Oreg.	76	114	81	22	61	87	109	83	53	105	14	146	79
Pa.	97	150	104	108	41	107	73	71	85	119	34	71	88
S. C.	87	207	89	103	95	86	105	129	53	27	46	76	92
S. Dak.	173	118	31	48	78	118	71	84	61	88	1	51	77
Tenn.	128	225	93	111	81	141	87	79	44	44	44	72	96
Tex.	161	100	50	48	85	98	99	91	38	54	88	73	82
Utah	115	105	68	66	70	116	61	63	261	119	15	37	91
Va.	106	169	85	95	74	109	139	127	37	108	90	62	100
Wash.	116	121	74	38	76	104	129	57	46	88	50	139	86
W. Va.	99	183	107	153	34	143	127	54	76	117	35	74	100
Wis.	157	150	57	90	76	134	57	111	72	75	19	64	88
Wyo.	100	112	58	60	74	106	62	71	81	73	1	55	71

PRELIMINARY REPORT ON TORNADOES IN THE UNITED STATES DURING 1939

BY R. J. MARTIN

[Weather Bureau, Washington, D. C., February 1940]

A preliminary report on the tornadoes which occurred within the United States during 1939 is here included in the December REVIEW, as has been the custom in recent years. A more detailed study will appear in the Meteorological Yearbook for 1939 which will be issued the latter part of 1940 or early in 1941. Practically all of the information contained in the present summary has been abstracted from the monthly REVIEW table of "Severe Local Storms" compiled from the reports of many observers and the various Section Directors of the Bureau. It must be remembered that all the statistics presented in this preliminary report are subject to change in the detailed study.

One hundred and thirty-eight tornadoes were reported during the year, with a death toll of 98, and property losses of more than $5,226,230. April, with 42 tornadoes and 58 fatalities, was the month with the greatest number of storms and largest loss of life. Approximately 30 percent of the year's tornadoes and over 59 percent of the total deaths occurred in this month, although property damage was exceeded by both June and August losses.

The spring season, March, April, and May, had 69 tornadoes, or exactly 50 percent of the year's total. Summer (June, July, and August) had 47 tornadoes, or about 34 percent. Tornado deaths during the Spring amounted to 69, or over 70 percent of the year's casualties. Tornadoes occurred without loss of life in July and October. No tornadoes were reported in November and December.

Arkansas, with 35 fatalities, was the State reporting the greatest number of deaths from tornadoes during the year. Texas was second with 12, Louisiana and Minnesota tied for third place with 10 deaths each. Oklahoma reported 7 fatalities, Tennessee and North Carolina 5 each, Florida 4, Alabama 3, Michigan 2, and New York, Virginia, South

Carolina, Georgia, and South Dakota one each. Nonfatal tornadoes occurred in Kansas, Iowa, Missouri, Illinois, Indiana, Pennsylvania, and New Jersey.

Michigan had the greatest tornado damage, with losses estimated at $1,725,000. Minnesota was second with damage amounting to $1,345,000, and Texas third with $543,800. In Virginia, North Carolina, South Carolina, Illinois, Louisiana, Arkansas, and Iowa losses exceeded $100,000, while in South Dakota, Kansas, Oklahoma, Missouri, Indiana, Tennessee, Mississippi, Alabama, Georgia, Florida, Pennsylvania, and New York losses varied from $10,000 for Pennsylvania to $92,050 for Kansas. No estimate of damage was obtained for the single tornado which occurred in New Jersey in April.

The preliminary estimate of total damage is only 67 percent of the preliminary figure for 1938 and is less than half the normal annual tornado damage, the normal being based on a 22-year period, 1916–37, inclusive. The total number of storms, 138, is only 3 less than the usual annual number, but the loss of life was only 55 percent of the 1938 total and about 37 percent of the normal annual death toll from tornadoes.

The most severe storm of the year in respect to fatalities was the one of April 16, which covered a path 15 miles long and 440 yards wide in Arkansas, causing 27 deaths, injuries to 62 persons, but property losses of only $20,000.

A storm in Florida in March caused 4 deaths, one in Louisiana in April caused 8, and one in Minnesota in June resulted in 9 fatalities. North Carolina had 4 deaths from one storm in February, and Oklahoma 7 deaths from one storm in April. Four of the 6 deaths in January resulted from a single storm in Tennessee.

The storms causing the greatest property damage occurred in Michigan and Minnesota. A storm in Kalamazoo, Mich., on August 8 caused losses of $1,050,000 and brought death to two persons. Other tornadoes in the same State on that date caused property damage amounting to $675,000. On June 18, a tornado in Minnesota resulted in 9 deaths and property losses of $1,300,000.

A total of 13 storms with some tornadic characteristics (some of these may have been tornadoes) were experienced during the year. These were mostly confined to February and August, and resulted in 4 deaths and property damage of over $1,435,000. In Illinois 3 deaths and losses of $1,000,000 occurred when tornadic winds visited western and central portions of the State on August 10, and one death and losses of $100,000 were reported in Cattaraugus County, N. Y., on September 29.

TORNADOES AND PROBABLE TORNADOES

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Number	4	13	12	42	15	26	7	14	3	2	0	0	138
Deaths	6	7	6	58	5	11	0	4	1	0	0	0	98
Damage [1]	54	287	262	553	377	1,610	70	1,947	6	60	0	0	[2] 5,226

TORNADIC WINDS AND POSSIBLE TORNADOES [3]

Number	0	5	0	0	0	1	1	5	1	0	0	0	13
Deaths	0	0	0	0	0	0	0	3	1	0	0	0	4
Damage [1]	0	310	0	0	0	5	4	1,016	100	0	0	0	[2] 1,435

[1] In thousands of dollars.
[2] Damage occurred in addition to amount shown.
[3] Some of these may not be classed as tornadoes in the final study.

DUSTSTORMS OF 1939 IN THE UNITED STATES

By R. J. MARTIN

[Weather Bureau, Washington, D. C., February 1940]

Duststorms of 1939 were not so widespread or destructive as in several previous years, although occasional storms, particularly in western areas, were locally as severe as any experienced since 1930. A few eastern districts noted dusty conditions, the dust usually being confined to the upper atmosphere, or falling mixed with rain or snow. The 1939 storms were not as numerous as in several recent years.

The storms of 1939 are here discussed by months, the descriptions, in most instances, being based on reports submitted by field officials of the Weather Bureau. At times these reports have been included almost verbatim in this summary.

January.—Despite continued dry conditions in much of the Winter Wheat Belt, with lack of moisture most acute in Oklahoma and Kansas and parts of Texas, Missouri, and Iowa, duststorms were mostly light in character and limited in extent during the month.

Considering the country as a whole, storms were most extensive on the 4th–6th. Geographically the most northern report of dust came from Havre, Mont., where light dust occurred on the 19th, and the farthest eastward was at Sault Ste. Marie, Mich., where light dust mixed with rain, or rain and snow, was reported on the 5th and 15th.

Storms in the central and southern Great Plains were most general between the 4th and 6th and after the 16th. The "Dust Bowl" had 3 to 5 days with pronounced soil blowing. At Dodge City, Kans., thick dust reduced visibility to less than 1 mile on the 27th and 31st, and as far south as Port Arthur, Tex., duststorms with reduced visibility continued for as long as 9 hours. At San Antonio, Tex., the storm on the 5th continued for 14 hours and at Abilene the storm lasted from early in the morning of the 5th to the night of the 6th. At Port Arthur and El Paso minimum visibilities were 2½ miles; at Abilene 1½ miles.

In South Dakota fresh to brisk winds were reported in all sections on the 14th and from the 21st to the 25th, with local dust blowing noted from McPherson westward to Carson County and from Dewey and Stanley Counties westward to Butte and Mead Counties from the 21st to the 25th.

In Colorado northwesterly winds on the 4th raised considerable dust in extreme eastern counties south of the Arkansas-Platte Divide, especially south of the Arkansas River. Shallow-rooted weeds were loosened and blown away, exposing loose and friable soil to erosion over large areas. In northeastern Baca County the visibility was reduced to zero for several hours in the lee of blowing fields. Strong northerly winds on the 22nd, 23rd, 25th, and 27th did slight damage to fields in Baca County. Dust reduced visibility to from 2,000 to 5,000 feet.

On the 31st, strong winds which continued for about 7 hours caused light to moderate dust in Lincoln, Kit Carson, Cheyenne, Kiowa, and Prowers Counties and considerable erosion occurred in Baca County where new areas began to blow. Thin stands of sorghum stalks failed to prevent blowing, and wheat, unprotected by strips of heavy sorghum growth, was generally blown out,